ISSN (ONLINE) : 2045-8711
ISSN (PRINT) : 2045-869X

INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY & CREATIVE ENGINEERING

October 2023
Vol - 13 No - 10
@IJITCE Publication

UK: Managing Editor
International Journal of Innovative Technology and Creative Engineering
1a park lane,
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London
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Ashok Nagar
Chennai, India 600083

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www.ijitce.co.uk

IJITCE PUBLICATION

International Journal of Innovative Technology & Creative Engineering

Vol.13 No.10

October 2023

www.ijitce.co.uk

Dear Researcher,

Greetings!

Articles in this issue discusses about study endeavours to recent trends in E-Banking.

We look forward many more new technologies in the next month.

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Prediction of Groundnut Leaf Disease Detection and Classification-Comparative Review of Machine Learning Techniques and their Analysis

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ABSTRACT

The world's largest producer of groundnuts is India. The edible leguminous oilseed groundnut (Arachishypogaea L.) is a significant crop. The groundnut's economic productivity is constrained by Groundnut Diseases attack is a significant causing low yield. In comparison to many other crops, groundnut crops are far more susceptible to diseases assault. In this work, with the aim of enhancing production through disease prevention and detection in several agricultural domain sectors. We proposed a deep-learning-based technique for identifying Groundnut diseases and Classification in a variety of Leafs using the plant village dataset, with the goal of increasing production through disease prevention and detection in diverse agricultural domain sectors. Many researchers have worked upon Groundnut leaf disease diagnosis and prognosis; each approach has a distinct accuracy rate, which changes depending on the scenario and datasets utilized. Our primary goal is to compare several current ML & Deep Learning approaches in order to identify the best effective method that would support the huge dataset with high efficiency of Predictions for Groundnut Leaf Disease Detection.

Keywords:
Groundnut Leaf Diseases and Classification, Machine Learning, Deep Learning, SVM,KNN,ANN,RandomForest,DecisionTrees,CNN.

I.INTRODUCTION

Agriculture is important in India because of the nation's fast growing population and rising food demand. Therefore, it is necessary to boost agricultural productivity. A substantial contributor to decreased agricultural productivity is disease caused by bacteria, viruses, and fungus. Farmers may collect data and information to maximise agricultural output by using information technology and precision agriculture. Precision agriculture, a relatively new technology, provides cutting-edge techniques to increase farm output. By utilizing this cutting-edge technology, agriculture may achieve economic success. Detecting plant pests, weeds, increasing crop productivity, finding plant diseases, and other uses are all possible with precision agriculture. Pesticides are used by farmers to eradicate pests, stop the spread of disease, and increase agricultural production. Crop diseases are leading to issues with poor output and financial losses for farmers and the agriculture sector. It is now required to identify the illness and its severity. The key to a successful farming system is identifying Groundnut Plant diseases.

Despite the fact that agriculture is the country's primary economic activity, industry today requires the most assistance. Over 70% of the population of India, a nation with a population of over a billion, lives in rural areas, and 40% of the labour force is employed there. Adama Zongo et al.[31] proposed Groundnut

Plant illness can directly result in stun growth, which has a negative impact on production. When it comes to nourishment, plants are a valuable resource for everyone. It is crucial to check if the Groundnut plant is free of the illness. Diseases must be detected if it manifests itself. There are several models available that may be used to identify and categorise Groundnut plant leaf diseases.The edible leguminous oilseed groundnut (Arachishypogaea L.) is a significant crop. The groundnut's economic productivity is constrained by diseases.

Frederick Kankam et al. [1] wrote a paper on how to classify Early leaf spot (Phyllosticaarachidishypogaea), Late leaf spot (Cercosporapersonatum) peanut-hypogea disease using Bio - Control Method. As a direct consequence of the widespread cultivation of groundnut, a number of biotic and abiotic factors have combined to create a substantial obstacle in the path of the successful growth of groundnut. Sclerotinia blight (Sclerotiniasclerotiorum), Botrytis blight (Botrytis cinerea), Charcoal rot (Macrophominaphaseolina), Cylindrocladium black rot (Cylindrocladiumcrotalariae), Rust (Pucciniaarachidis), and Puccinia blight (Pucciniaarachidis) are only few of the The tomato spotted wilt virus (TSWV) & peanuts bud necrosis virus are two of the same family.

Ekta Joshi et al.[22] proposed recently, the deadly groundnut disease caused by Sclerotiumrolfsii has spread to India. It resulted in a groundnut crop loss of 80%. According with a 59% frequency, stem rot brought on by Sclerotiumrolfsii (Corticiumrolfsii) is one of the worst dangers in India. It is possible to put a halt to it by applying techniques for recognizing illnesses that might affect groundnut plants. Because of the high focus that machine learning approaches put on the information itself and the significance that they put on the results of specific activities, these techniques may be utilized to diagnose diseases.

DivyanshuVarshney et al.[2] - The primary objective of this study is to investigate the various ML and DL algorithms that have been successful in assisting humans with the predictions of Groundnut Leaf Diseases & Classification. Our primary objective is to identify the groundnut leaf disease prediction algorithm that is most suited to our needs in terms of both accuracy and suitability. Yu Liang et al. [11] In order to accomplish this, we have researched and analyzed the previous studies of Groundnut Leaf Disease prediction algorithms. The authors, Neha Suresh et al. [12] In light of this, we have partitioned our review paper into a variety of parts, each of which will provide a comparative examination of the various algorithms in terms of the accuracy rate that they achieve. Following the conclusion of that comparison, we will focus on the machine learning method that is best suited for the prediction of Groundnut Leaf Disease.

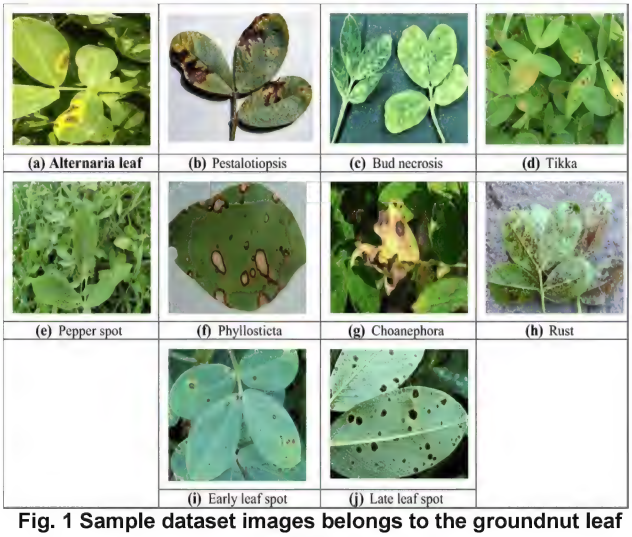


Fig. 1 Sample dataset images belongs to the groundnut leaf diseases

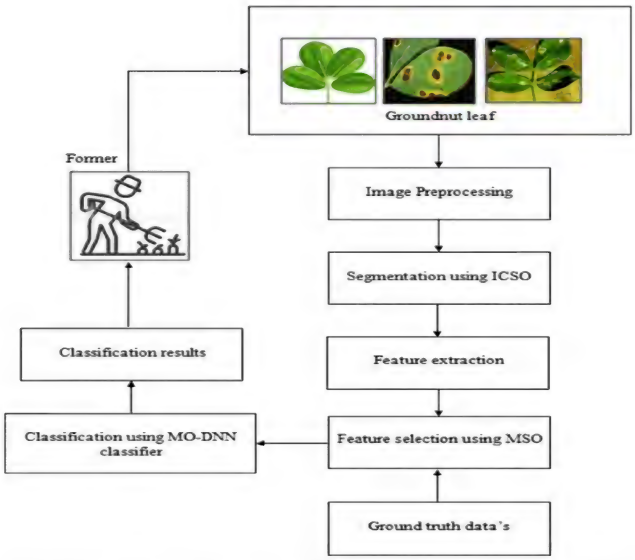


Fig. 2 Machine and Deep Learning Architecture for Detection and Classification of Groundnut Leaf Disease

II LITERATURE REVIEW

1.MACHINE LEARNING TECHNIQUES FOR PREDICTION OF GROUNDNUT LEAF DISEASES DETECTION AND CLASSIFICATION

Abu Sarwar Zamani et al.[9] proposed large quantity of data, the ML model examines the data, and we may make a forecast about the future based on the notion of that training model [10]. ML is an automated learning approach in which the algorithms are built to find out from previous datasets. The following is a list of the important machine learning methods that may be used for the prediction and classification of plant diseases.

A.ARTIFICIAL NEURAL NETWORK (ANN)

The ANN [28] is maybe a method that is used often in the data mining process. There are three different types of layers that make up an ANN: The initial data are stored in the NN's input layer. The outstanding effectiveness of neural networks in areas such as data transformations and the generation of automated features, among other areas, is due to the presence of hidden layers. The output layer is responsible for making the definitive forecast. This method is used in order to identify the pattern that is excessively intricate. Processing in parallel, storing data in a distributed memory, arriving at a collective solution, and specifying requirements are all required for algorithms.

B.LOGISTICS REGRESSION (LR)

It is a method for supervised learning that incorporates a greater number of dependent variables. The answer that is produced by using this technique is in binary form. The ongoing result of certain data may be obtained via the use of logistics regression. The core of this technique is a statistical model that uses a binary variable.

C.K-NEAREST NEIGHBOR (KNN)

G.Valarmathi et al.[18] proposed The process of pattern recognition makes use of this algorithm. It is a useful method for predicting illnesses that affect plant leaves. Each category has been assigned the same level of significance so that the pattern may be identified. K. Suganya Devi and colleagues [23] suggested using K Nearest Neighbor to retrieve comparable highlighted data from a massive dataset. We categories a large dataset based on the degree to which its characteristics are comparable to one another[26][29].

D.DECISION TREE (DT)

Shruthi et al.[27] proposed The segmentation and regression models serve as the foundation for the decision tree. A reduced number of subsets are created from the original dataset. The predictions that can be made with this more limited body of information have the greatest possible degree of accuracy. The CART and conditional trees are both part of the decision tree approach.

E. NAIVE BAYES ALGORITHM (NB)

Utilizing this model allows one to make the assumption of a substantial training dataset. The Bayesian approach is used by the program in order to determine the probability [27]. The authors SukhvirKaur et al.[29] claimed that it offers the highest possible accuracy when computing the probability of noisy information that is utilized as an input.

F.SUPPORT VECTOR MACHINE (SVM)

It is a kind of supervised learning technique that may be used to issues involving classification as well as regression [2]. This literature, which was written by Stefania Barburiceanu and others[19][26], includes both theoretical and numerical functions that may be used to resolve the regression issue. During the process of making predictions using massive datasets, it offers the highest possible accuracy rate.

G.RANDOM FOREST (RF)

The RF method [17][29] is based on supervised learning, is used to tackle issues involving classification & regression. It's a fundamental component of machine learning that's used to make forecasts about future data based on analyses of the data that came before [30].

H.K MEANS ALGORITHM

Vijai Singh et al.[24] introduced A clustering technique known as K means. This algorithm produces a division of the information in the form of tiny clusters. This algorithm was introduced by MonishankerHalder et al. [28], and its purpose is to determine the degree of similarity between various data points. The precise data points comprise at least one clustersthat is best suited for the examination of large datasets [33].

2. DEEP LEARNING TECHNIQUES FOR PREDICTION OF GROUNDNUT LEAF DISEASES DETECTION AND CLASSIFICATION

A Highly comprehensive form of ANN is known as deep learning. The architecture of the algorithms used in deep learning consists of many layers [15], [21]. These techniques are utilized to handle large amounts of environmental data and can detect all data from a range of categories [25]. Once we have a significant quantity of data that has not been labeled, we most often turn to unsupervised deep learning algorithms [16].

A.CONVOLUTIONAL NEURAL NETWORK

Andr´eAbade a et al.[14] During the preparation phase, CNN employs to explore the different sets of data in order to examine the plant leaf diseases database in the form of pictures. Using certain filters, CNN is able to capture the various characteristics of images. The pooling layer, the convolutional layer, the classification layer, and the fully connected layer are the four different types of layers. CNN is that which is formed by combining all of these levels.

B. REGIONS WITH CONVOLUTIONAL NEURAL NETWORK(R–CNN)

Changjian Zhou and colleagues [20] made a proposal. In the fields of computer vision & image processing, a group of ML models known as regions with CNN, or R CNNs, is deployed. The primary objective of every R-CNN is to recognize objects in any input picture and define borders around them. R-CNNs were developed specifically for the task of object detection. The process of locating and categorizing various things present in a picture is referred to as object detection. One method for deep learning is called regions with convolutional neural networks (R-CNN). A CNN may be a class of neural network, and it may contain some hidden states and perform nonlinear transformation of the inputs within the network. It can handle a series of inputs by employing the same variables at each layer, reducing the difficulty of those factors more precisely than other neural networks. It cannot, however, handle an excessive amount of input sequences using the ReLU and Tanh activating functions.

III. MACHINE LEARNING ALGORITHMS FOR PREDICTION OF GROUNDNUT LEAF PEST PERCEPTION & CATEGORIZATION

A.NONLINEARALGORITHMS

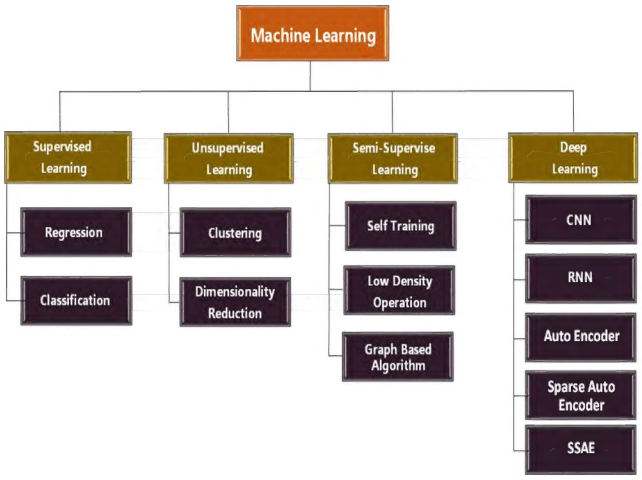
Nonlinear methods such as RF, NB, SVM and K Nearest Neighbor were utilized in comparison by researchers for the Prognosis of Groundnut Leaf Pest. Following the investigation, the authors discovered that the delicacy level of the RF method was 92.2, while the sensitivity of the Bagging algorithm was 92.2. The authors employed the Support Vector Machine (SVM) for the Sense of Groundnut Leaf Pest, which is a recursive point exclusion method with a predictive machine literacy model. For Groundnut Leaf Pest Perception and Categorizing, Support Vector Machine, Decision Tree, Naive Bayes and K Nearest Neighbor were utilized.

B. LINEAR AND NONLINEAR ALGORITHM

Arpan Singh Rajput etal.(7) proposed For the prediction of Groundnut Leaf Pest Perception and Categorizing, features selection and feature birth methods based on Artificial Neural Network (ANN), Support Vector Machine (SVM) and Naive Bayes (NB) were used. A feature selection is the selection of sub features from a large dataset to aid in the calculating process.

K. GowrishankarEtal.(13) Coloration grounded Feature selection (CFS), Linear Discriminant Analysis, and Recursive Feature Elimination were used by the authors to compare each system. Following a comparative

examination using various feature selection techniques, the authors discovered that the ANN had a higher delicacy rate than the alternative algorithms. The SVM delicacy was 95.3, the ANN delicacy was 96.9, and the NB delicacy was 91.



C.NONLINEAR AND ENSEMBLE ALGORITHM

Archana Chaudhary etal.(32) The suggested Decision Tree, Naive Bayes, and K Nearest Neighbor were compared on a dataset for Groundnut Leaf Pest Perception and Categorizing. To examine the effectiveness of each algorithm, authors discovered that The NB method had a delicacy of 95.99, which was greater than the decision tree with K Nearest Neighbor algorithms. Five nonlinear machine learning algorithms were examined for Groundnut Leaf Pest Perception and Categorizing: Multi-Layer Perceptron (MLP), K Nearest Neighbors (KNN), Categorizing And Regression Tree, Support Vector Machines (SVM), and Gaussian Naive Bayes. The author's main goal was to compare the efficacy and efficacy of algorithms for Groundnut Leaf Pest Perception and Categorizing. The author also independently assessed the delicacy of each algorithm.

To manage the large number of classes based on probabilistic propositions, the Naive Bayes probabilistic model is utilized. The authors discovered that the delicacy position of Naive Bayes was 82.6, whereas the delicacy of the best appropriate algorithm for Groundnut Leaf Pest Perception and Categorizing was 82.6.

For the Groundnut Leaf Pest Perception and Categorizing, researchers used Naive Bayes, Random Forest, Logistics Regression, Multi-Layer Perceptron, and K Nearest Neighbors. Each method was tested on a dataset to determine its delicacy.

D.DEEP LEARNING ALGORITHM

RutujaRajendraPatil etal.(5) To predict Plant Leaf Pest Perception and Categorization, the authors used a deep learning system with machine learning algorithms such as Naive Bayes, Decision Tree, Support Vector Machine (SVM), and Random Forest. Sunil C. and co. Following a comparative analysis of Decision Tree, Naive Bayes, Random Forest, and Support Vector Machine (SVM), the authors discovered that the algorithm's delicacy rate is higher with EfficientNet and CNN(98.26).

Deep learning methods such as Stack Sparse Auto Encoder (SSAE), meager bus Encoder (SAE), and Convolutional Neural Network (CNN) were utilized to develop Groundnut Leaf Pest Perception and Categorizing with no errors. The delicacy of SSAE, SAE, and CNN was individually 98.9, 98.5, and 97.

Siddhartha Das et al.(3) provided an end-to-end training strategy for the discovery of Groundnut Leaf Pest Perception and Categorizing utilizing a deep learning algorithm.

Tarunkumarreddy et al.(4) proposed using the Confusion matrix to construct the Resnet50 & VGG16 patch classifiers. DL technology was used to dissect the Leaf images, learning effectiveness was evaluated using multiple training sets, while image visualization was enhanced by introducing more and additional patches surrounding the ROI and in the backdrop.

IV.DISCUSSION

This work focuses on numerous machine learning and deep learning strategies for detecting and classifying groundnut leaf diseases.

Following a comparison of such methods, we determined that the ML algorithm SVM is the best fit for detecting and classifying Groundnut Leaf Diseases. ML and DL technologies are already being used to predict the detection and

classification of Groundnut Leaf Disease. The algorithms' accuracy vary depending on the dataset. As a consequence, we continue to seek advanced level models and methodologies, such as DL and ML algorithms.

The key issue in predicting Groundnut Leaf Disease Detection and Classification using machine learning and deep learning approaches is the availability of datasets. Each approach requires a considerable amount of training data in order to do computational measurements, however many researchers are now attempting to making the datasets open source & available in the form of raw pictures.

V.CONCLUSION

In this research, evaluated several ML and DL techniques for the recognition and categorization of groundnut plant disease. Our primary goal is to identify the best algorithm for predicting the incidences of Groundnut Leaf disease. The major purpose of this study is to highlight all existing research of ML algorithms employed in the prediction of Groundnut Leaf disease. This article also contains all of the knowledge required for novices to investigate machine learning algorithms in order to build a firm foundation in deep learning. This research starts with a review of the many varieties of Groundnut Leaf Disease Detection and Classification, with the purpose of infusing some knowledge about the major types, symptoms, and causes of Groundnut Plant Disease Detection. Then, a review of the key ML methods, ensembles approaches, and DL techniques was provided, and these techniques significantly expand the algorithms used for Groundnut Leaf Disease Detecting predictions. There are still certain difficulties that need to be resolved with future effort. Researchers may overcome the limitations of accessible datasets by using data augmentation methods. Researchers should evaluate the concerns of inequality of positive and negative data since it might lead to bias toward positive or negative prediction. Another critical problem that must be addressed is the uneven amount of Groundnut Plant Disease Detection photos vs afflicted patches for accurate diagnosis and prediction of Groundnut Leaf Disease Detection and Classification.

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October 2023
Vol - 13 No - 10
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